

## DIMENSIONS AND UNITS

To get the value of a quantity in Gaussian units, multiply the value expressed in SI units by the conversion factor. Multiples of 3 in the conversion factors result from approximating the speed of light  $c = 2.9979 \times 10^{10}$  cm/sec  $\approx 3 \times 10^{10}$  cm/sec.

Physical Quantity	Symbol	Dimensions		SI Units	Conversion Factor	Gaussian Units
		SI	Gaussian			
Capacitance	$C$	$\frac{t^2 q^2}{ml^2}$	$l$	farad	$9 \times 10^{11}$	cm
Charge	$q$	$q$	$\frac{m^{1/2} l^{3/2}}{t}$	coulomb	$3 \times 10^9$	statcoulomb
Charge density	$\rho$	$\frac{q}{l^3}$	$\frac{m^{1/2}}{l^{3/2} t}$	coulomb /m <sup>3</sup>	$3 \times 10^3$	statcoulomb /cm <sup>3</sup>
Conductance		$\frac{tq^2}{ml^2}$	$\frac{l}{t}$	siemens	$9 \times 10^{11}$	cm/sec
Conductivity	$\sigma$	$\frac{tq^2}{ml^3}$	$\frac{1}{t}$	siemens /m	$9 \times 10^9$	sec <sup>-1</sup>
Current	$I, i$	$\frac{q}{t}$	$\frac{m^{1/2} l^{3/2}}{t^2}$	ampere	$3 \times 10^9$	statampere
Current density	$\mathbf{J}, \mathbf{j}$	$\frac{q}{l^2 t}$	$\frac{m^{1/2}}{l^{1/2} t^2}$	ampere /m <sup>2</sup>	$3 \times 10^5$	statampere /cm <sup>2</sup>
Density	$\rho$	$\frac{m}{l^3}$	$\frac{m}{l^3}$	kg/m <sup>3</sup>	$10^{-3}$	g/cm <sup>3</sup>
Displacement	$\mathbf{D}$	$\frac{q}{l^2}$	$\frac{m^{1/2}}{l^{1/2} t}$	coulomb /m <sup>2</sup>	$12\pi \times 10^5$	statcoulomb /cm <sup>2</sup>
Electric field	$\mathbf{E}$	$\frac{ml}{t^2 q}$	$\frac{m^{1/2}}{l^{1/2} t}$	volt/m	$\frac{1}{3} \times 10^{-4}$	statvolt/cm
Electromotance	$\mathcal{E}, \text{Emf}$	$\frac{ml^2}{t^2 q}$	$\frac{m^{1/2} l^{1/2}}{t}$	volt	$\frac{1}{3} \times 10^{-2}$	statvolt
Energy	$U, W$	$\frac{ml^2}{t^2}$	$\frac{ml^2}{t^2}$	joule	$10^7$	erg
Energy density	$w, \epsilon$	$\frac{m}{lt^2}$	$\frac{m}{lt^2}$	joule/m <sup>3</sup>	10	erg/cm <sup>3</sup>

Physical Quantity	Sym- bol	Dimensions		SI Units	Conversion Factor	Gaussian Units
		SI	Gaussian			
Force	<b>F</b>	$\frac{ml}{t^2}$	$\frac{ml}{t^2}$	newton	$10^5$	dyne
Frequency	$f, \nu$	$\frac{1}{t}$	$\frac{1}{t}$	hertz	1	hertz
Impedance	$Z$	$\frac{ml^2}{tq^2}$	$\frac{t}{l}$	ohm	$\frac{1}{9} \times 10^{-11}$	sec/cm
Inductance	$L$	$\frac{ml^2}{q^2}$	$\frac{t^2}{l}$	henry	$\frac{1}{9} \times 10^{-11}$	sec <sup>2</sup> /cm
Length	$l$	$l$	$l$	meter (m)	$10^2$	centimeter (cm)
Magnetic intensity	<b>H</b>	$\frac{q}{lt}$	$\frac{m^{1/2}}{l^{1/2}t}$	ampere–turn/m	$4\pi \times 10^{-3}$	oersted
Magnetic flux	$\Phi$	$\frac{ml^2}{tq}$	$\frac{m^{1/2}l^{3/2}}{t}$	weber	$10^8$	maxwell
Magnetic induction	<b>B</b>	$\frac{m}{tq}$	$\frac{m^{1/2}}{l^{1/2}t}$	tesla	$10^4$	gauss
Magnetic moment	$m, \mu$	$\frac{l^2q}{t}$	$\frac{m^{1/2}l^{5/2}}{t}$	ampere–m <sup>2</sup>	$10^3$	oersted–cm <sup>3</sup>
Magnetization	<b>M</b>	$\frac{q}{lt}$	$\frac{m^{1/2}}{l^{1/2}t}$	ampere–turn/m	$10^{-3}$	oersted
Magneto- motance	$\mathcal{M},$ Mmf	$\frac{q}{t}$	$\frac{m^{1/2}l^{1/2}}{t^2}$	ampere–turn	$\frac{4\pi}{10}$	gilbert
Mass	$m, M$	$m$	$m$	kilogram (kg)	$10^3$	gram (g)
Momentum	<b>p, P</b>	$\frac{ml}{t}$	$\frac{ml}{t}$	kg–m/s	$10^5$	g–cm/sec
Momentum density		$\frac{m}{l^2t}$	$\frac{m}{l^2t}$	kg/m <sup>2</sup> –s	$10^{-1}$	g/cm <sup>2</sup> –sec
Permeability	$\mu$	$\frac{ml}{q^2}$	1	henry/m	$\frac{1}{4\pi} \times 10^7$	—

Physical Quantity	Symbol	Dimensions		SI Units	Conversion Factor	Gaussian Units
		SI	Gaussian			
Permittivity	$\epsilon$	$\frac{t^2 q^2}{ml^3}$	1	farad/m	$36\pi \times 10^9$	—
Polarization	$\mathbf{P}$	$\frac{q}{l^2}$	$\frac{m^{1/2}}{l^{1/2}t}$	coulomb/m <sup>2</sup>	$3 \times 10^5$	statcoulomb/cm <sup>2</sup>
Potential	$V, \phi$	$\frac{ml^2}{t^2 q}$	$\frac{m^{1/2}l^{1/2}}{t}$	volt	$\frac{1}{3} \times 10^{-2}$	statvolt
Power	$P$	$\frac{ml^2}{t^3}$	$\frac{ml^2}{t^3}$	watt	$10^7$	erg/sec
Power density		$\frac{m}{lt^3}$	$\frac{m}{lt^3}$	watt/m <sup>3</sup>	10	erg/cm <sup>3</sup> -sec
Pressure	$p, P$	$\frac{m}{lt^2}$	$\frac{m}{lt^2}$	pascal	10	dyne/cm <sup>2</sup>
Reluctance	$\mathcal{R}$	$\frac{q^2}{ml^2}$	$\frac{1}{l}$	ampere-turn/weber	$4\pi \times 10^{-9}$	cm <sup>-1</sup>
Resistance	$R$	$\frac{ml^2}{tq^2}$	$\frac{t}{l}$	ohm	$\frac{1}{9} \times 10^{-11}$	sec/cm
Resistivity	$\eta, \rho$	$\frac{ml^3}{tq^2}$	$t$	ohm-m	$\frac{1}{9} \times 10^{-9}$	sec
Thermal conductivity	$\kappa, k$	$\frac{ml}{t^3}$	$\frac{ml}{t^3}$	watt/m-deg (K)	$10^5$	erg/cm-sec-deg (K)
Time	$t$	$t$	$t$	second (s)	1	second (sec)
Vector potential	$\mathbf{A}$	$\frac{ml}{tq}$	$\frac{m^{1/2}l^{1/2}}{t}$	weber/m	$10^6$	gauss-cm
Velocity	$\mathbf{v}$	$\frac{l}{t}$	$\frac{l}{t}$	m/s	$10^2$	cm/sec
Viscosity	$\eta, \mu$	$\frac{m}{lt}$	$\frac{m}{lt}$	kg/m-s	10	poise
Vorticity	$\zeta$	$\frac{1}{t}$	$\frac{1}{t}$	s <sup>-1</sup>	1	sec <sup>-1</sup>
Work	$W$	$\frac{ml^2}{t^2}$	$\frac{ml^2}{t^2}$	joule	$10^7$	erg

## INTERNATIONAL SYSTEM (SI) NOMENCLATURE<sup>6</sup>

Physical Quantity	Name of Unit	Symbol for Unit	Physical Quantity	Name of Unit	Symbol for Unit
*length	meter	m	electric potential	volt	V
*mass	kilogram	kg	electric resistance	ohm	$\Omega$
*time	second	s	electric conductance	siemens	S
*current	ampere	A	electric capacitance	farad	F
*temperature	kelvin	K	magnetic flux	weber	Wb
*amount of substance	mole	mol	magnetic inductance	henry	H
*luminous intensity	candela	cd	magnetic intensity	tesla	T
†plane angle	radian	rad	luminous flux	lumen	lm
†solid angle	steradian	sr	illuminance	lux	lx
frequency	hertz	Hz	activity (of a radioactive source)	becquerel	Bq
energy	joule	J	absorbed dose (of ionizing radiation)	gray	Gy
force	newton	N			
pressure	pascal	Pa			
power	watt	W			
electric charge	coulomb	C			

\*SI base unit

†Supplementary unit

### METRIC PREFIXES

Multiple	Prefix	Symbol	Multiple	Prefix	Symbol
$10^{-1}$	deci	d	10	deca	da
$10^{-2}$	centi	c	$10^2$	hecto	h
$10^{-3}$	milli	m	$10^3$	kilo	k
$10^{-6}$	micro	$\mu$	$10^6$	mega	M
$10^{-9}$	nano	n	$10^9$	giga	G
$10^{-12}$	pico	p	$10^{12}$	tera	T
$10^{-15}$	femto	f	$10^{15}$	peta	P
$10^{-18}$	atto	a	$10^{18}$	exa	E